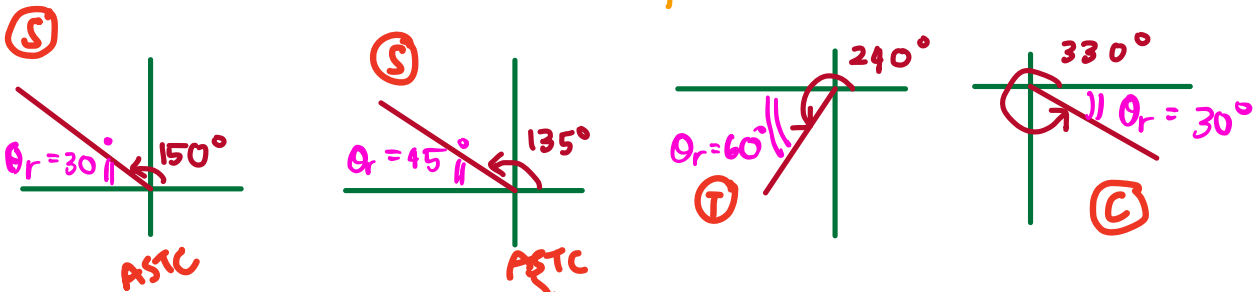
(d) $\dfrac{\cos(150°)\tan(-135°)}{\csc(240°)\sec(-690°)}$ ← even $\sec(-690°) = \sec 690°$

$$= \frac{\cos 150° \,(-\tan 135°)}{\frac{1}{\sin 240°}\;\frac{1}{\cos(330° + 360°)}}$$

Q2, Q2, Q3, Q4 — even / odd — periodic



ASTC, ASTC

$$= \frac{-\cos 30° \,[-(-\tan 45°)]}{\frac{1}{-\sin 60°}\;\frac{1}{\cos 30°}}$$

Ref ∅

ASTC

$$= \frac{-\frac{\sqrt{3}}{2}\,(1)}{-\frac{1}{\sqrt{3}/2}\;\frac{1}{\sqrt{3}/2}}$$

Special ∅

$$= \frac{-\sqrt{3}/2}{-\frac{2}{\sqrt{3}} \cdot \frac{2}{\sqrt{3}}}$$

$$= -\frac{\sqrt{3}}{2} \times -\frac{3}{4}$$

$$= \frac{3\sqrt{3}}{8} \#$$

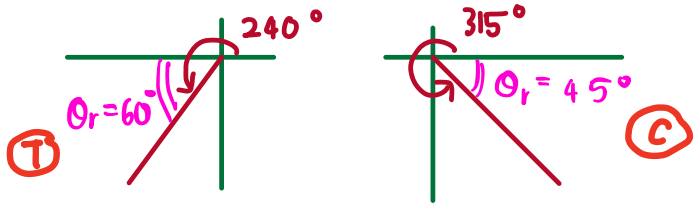
19. Without using calculator, find the exact value of the expression and rationalize where appropriate.

$$\frac{\csc(-240°) + \sin(-315°)}{\tan(1050°)\sec(60°)}$$

$$= \frac{\frac{1}{-\sin 240°} + (-\sin 315°)}{\tan(150° + 180°(5))\ \frac{1}{\cos 60°}}$$ even/odd

periodic

$$= \frac{\frac{1}{-\sin 240°} - \sin 315°}{\tan 150° \ \frac{1}{\cos 60°}}$$ Q4 Q3 Q2



$$= \frac{\frac{1}{-(-\sin 60°)} - (-\sin 45°)}{-\tan 30° \ \frac{1}{\cos 60°}}$$ Ref θ

$$= \frac{\frac{1}{\sqrt{3}/2} + \frac{\sqrt{2}}{2}}{-\frac{\sqrt{3}}{3}\ \frac{1}{1/2}}$$ special θ

$$= \left(\frac{2}{\sqrt{3}} + \frac{\sqrt{2}}{2} \right) \div -\frac{2\sqrt{3}}{3}$$

$$= \frac{4 + \sqrt{6}}{2\sqrt{3}} \times \frac{-3}{2\sqrt{3}}$$

$$= \frac{-12 - 3\sqrt{6}}{12}$$

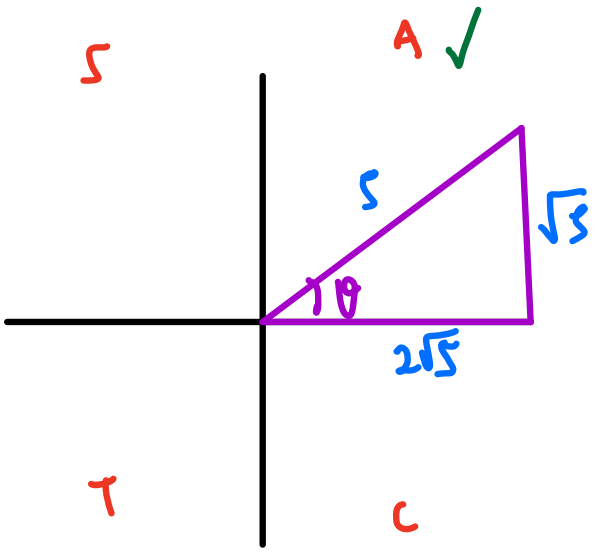
$$= \frac{-4 - \sqrt{6}}{4}$$

*@ $-\left(\frac{4+\sqrt{6}}{4}\right)$ #

FINDING EXACT VALUE OF 6 TRIG FUNCTION

① Given $\sin\theta = +\frac{\sqrt{5}}{5}$ $\frac{O}{H}$ and $\cos\theta = +\frac{2\sqrt{5}}{5}$, $\frac{A}{H}$

find ē exact value of the four remaining trigonometric functions:



① $\tan\theta = \frac{\sqrt{5}}{2\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{5}{10} = \frac{1}{2}$ #

② $\csc\theta = \frac{1}{\sin\theta} = \frac{5}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{5\sqrt{5}}{5}$

$= \sqrt{5}$ #

③ $\cot\theta = \frac{1}{\tan\theta} = 2$ #

④ $\sec\theta = \frac{1}{\cos\theta}$

$= \frac{5}{2\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$

$= \frac{5\sqrt{5}}{10}$

$= \frac{\sqrt{5}}{2}$ #

Tips!

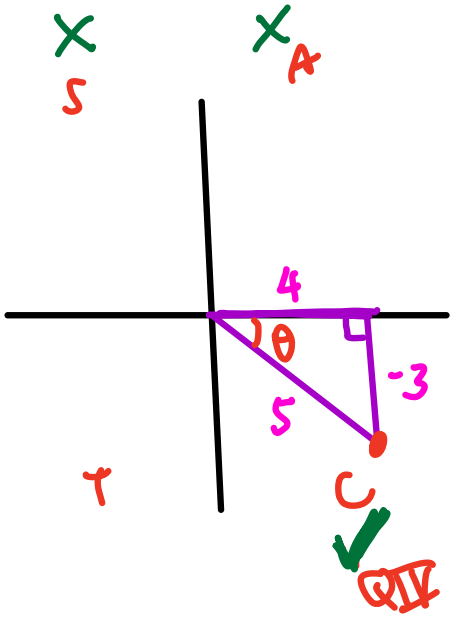
① Quadrant?

② Draw △

③ Calculate!

② Given $\sin\theta = -\frac{3}{5}$, $\cos\theta = \frac{4}{5}$ ✓,

⇒ find the other 4 trigo function



① $\tan\theta = -\frac{3}{4}$ #

② $\cot\theta = -\frac{4}{3}$ *

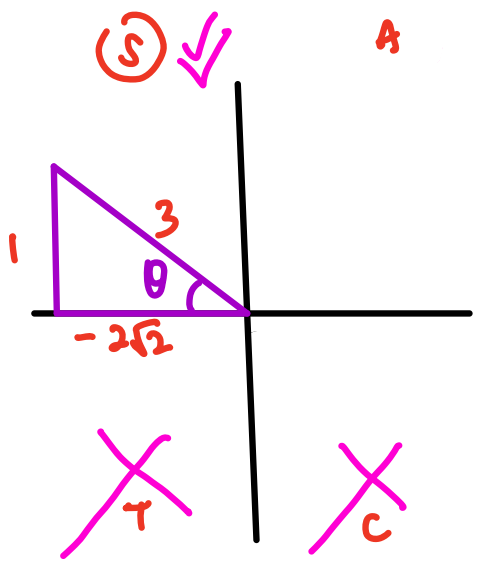
③ $\csc\theta = -\frac{5}{3}$ *

④ $\sec\theta = \frac{5}{4}$ *

* Triangle: attach to x-axis

↳ cos θ, sec θ ↳ sin θ, csc θ

③ Given $\sin\theta = \frac{1}{3}$ (+ve), and $\cos\theta < 0$ (−ve), find the exact values of the remaining trigo



① $\cos\theta = -\frac{2\sqrt{2}}{3}$

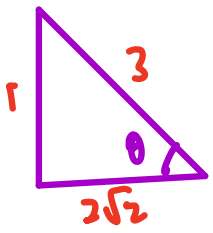
② $\tan\theta = -\frac{1}{2\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{-\sqrt{2}}{4}$ #

③ $\cot\theta = -2\sqrt{2}$ #

④ $\csc\theta = 3$ #

⑤ $\sec\theta = -\frac{3}{2\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$

$= \frac{-3\sqrt{2}}{4}$ #



$\sqrt{3^2 - 1^2}$

$= \sqrt{9-1}$

$= \sqrt{8}$

$= \sqrt{4 \cdot 2}$

$= \sqrt{4}\sqrt{2}$

$= 2\sqrt{2}$

Homework:

(1) Given $\tan\theta = \frac{1}{2}$ and $\sin\theta < 0$, find exact values of the remaining trigonometric functions

(2) Given $\tan\theta = \frac{2}{3}$ and θ in quadrant III, find exact value of $\cos\theta$

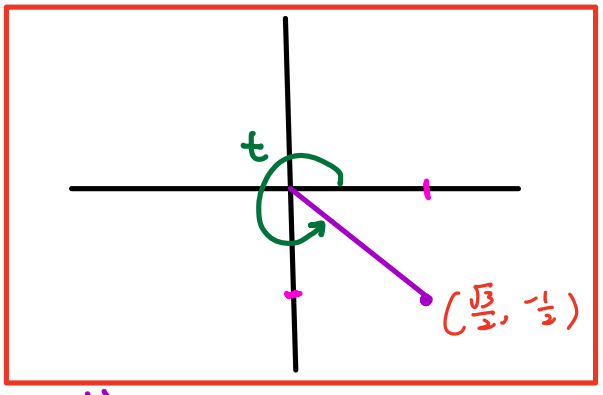
TERMINAL POINT

If terminal point for real t is $\left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$,

find terminal point for

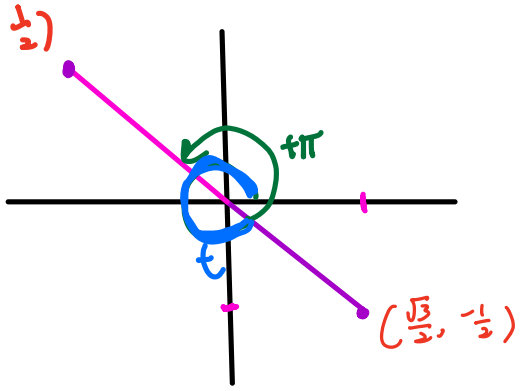
(a) $t + \pi$ (c) $\pi - t$ (e) $\frac{\pi}{2} - t$

(b) $t - \pi$ (d) $t - \frac{\pi}{2}$



(5) III $(-, +)$

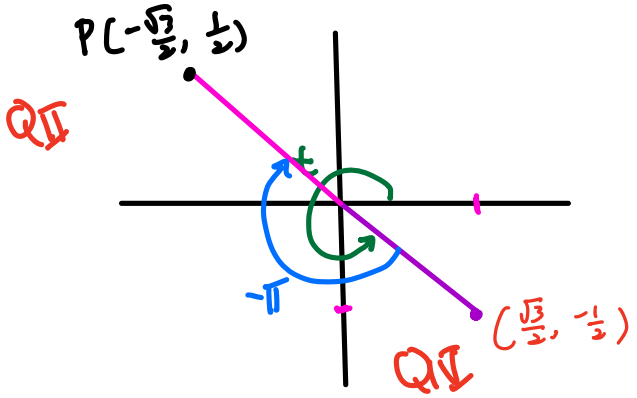
$P\left(-\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$



(a) $t + \pi$

$= t + 180^\circ$ (anti clockwise)

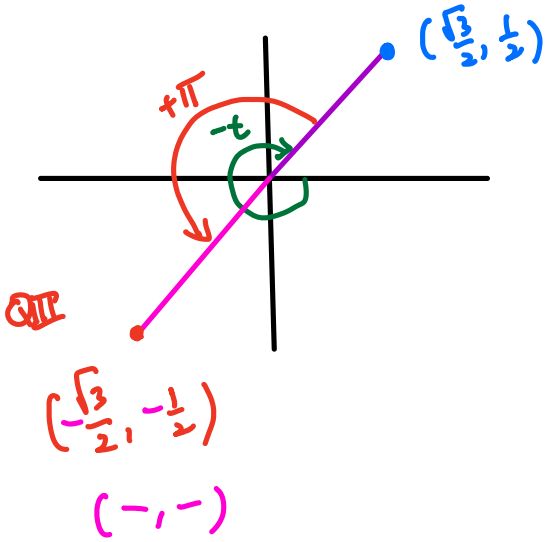
$\therefore P\left(-\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$ #



(b) $t - \pi$ (clockwise)

$= t - 180°$

$\therefore P(-\frac{\sqrt{3}}{2}, \frac{1}{2})$ #



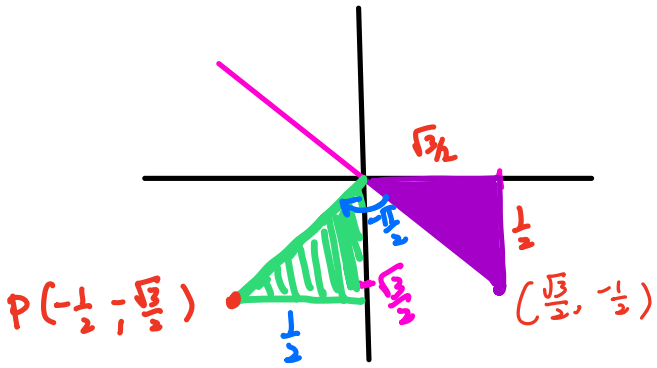
(c) $\pi - t$

(clock) → (anti-c)

$= -t + \pi$

$= -t + 180°$

$\therefore P(-\frac{\sqrt{3}}{2}, -\frac{1}{2})$ #

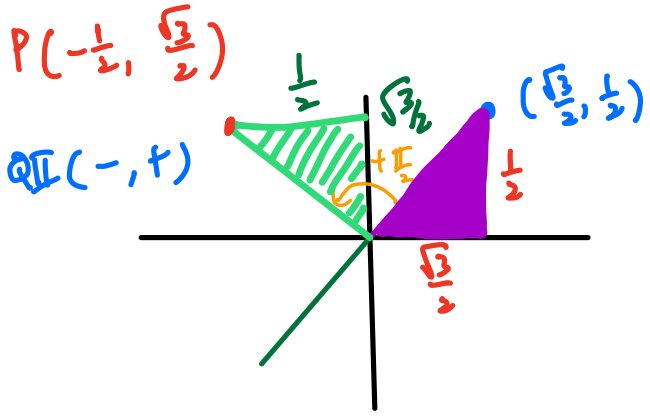


QIII $(-, -)$

(d) $t - \frac{\pi}{2}$

$= t - 90°$ (clock)

$P(-\frac{1}{2}, -\frac{\sqrt{3}}{2})$ #



(e) $\frac{\pi}{2} - t$

$= -t + \frac{\pi}{2}$

$= -t + 90°$ (anti clock)

$P(-\frac{1}{2}, \frac{\sqrt{3}}{2})$ ✱